



## **Leveraging the AAU Undergraduate STEM Education Initiative to Understand and Advance the Institutionalization of STEM Teaching and Learning Reforms (NSF IUSE)**

The [Leveraging the AAU STEM Education Initiative project](#) aims to examine the institutional landscape in which innovations to undergraduate STEM education take place. We are also interested in learning how universities can successfully coordinate multiple undergraduate STEM education reforms to achieve sustainable change on our campuses.

This project is guided by the following research questions:

- What internal factors (e.g., leadership, resources, faculty development) influence the alignment, coordination, and institutionalization of multiple funded efforts within a single campus to improve undergraduate STEM teaching and learning?
- What role do external factors (e.g., peer institutions, disciplinary associations, national organizations) play in a campus's efforts to improve and institutionalize STEM undergraduate reform?
- How does the configuration of STEM reform programs on an individual campus affect the institutionalization of STEM reforms?
- Are there models that work particularly well? If so, what practical activities can various internal and external groups employ to create environments that are conducive to widespread and sustained institutional change in STEM teaching and learning?

To address the questions AAU seeks to answer, we intend to visit eight AAU campuses to interview key individuals and groups to better understand what factors influence the implementation, institutionalization, and alignment of multiple reform efforts within a single campus to improve undergraduate STEM teaching and learning. We also aim to identify models and strategies that work particularly well in supporting widespread and sustained institutional change and reform.

This project builds upon the AAU Undergraduate STEM Education Initiative and is designed in recognition of the reality that many AAU universities are advancing multiple department-level as well as institution-wide efforts to improve undergraduate STEM teaching and learning. To provide greater context, below is a summary status report of the initiative at-large.

### **AAU Undergraduate STEM Education Initiative**

In 2011, AAU launched the [AAU Undergraduate STEM Education Initiative](#) to improve the quality of undergraduate teaching and learning in science, technology, engineering and mathematics (STEM) fields at member institutions. The initiative's overall objective is to influence the culture of STEM departments at AAU institutions so that faculty members are encouraged and supported to use teaching practices proven by research to be effective in helping students successfully learn STEM.

The goals of AAU's Undergraduate STEM Education Initiative are to:

- Develop an effective analytical framework for assessing and improving the quality of STEM teaching and learning;
- Support AAU STEM project sites at a subset of AAU universities to implement the framework, and develop a broader network of AAU universities committed to implementing STEM teaching and learning reforms;
- Explore means that institutions and departments can use to train, recognize, and reward faculty members who want to improve the quality of their STEM teaching;
- Work with federal research agencies to develop means of recognizing, rewarding, and promoting efforts to improve undergraduate learning; and
- Develop effective means for sharing information about promising and effective undergraduate STEM education programs, approaches, methods, and pedagogies.

To advance this objective, AAU is engaged in a set of highly focused activities for which it has been awarded eight grants totaling \$7.2M. To date, the AAU project has resulted in:

- The development and dissemination of a [Framework for Systemic Change in Undergraduate STEM Teaching and Learning](#) that provides a model for improving the quality and effectiveness of STEM teaching and learning at research universities.
- Seed-funding for eight AAU member project sites (Brown University; Michigan State University; The University of Arizona; University of California, Davis; University of Colorado, Boulder; University of North Carolina at Chapel Hill; University of Pennsylvania; and Washington University in St. Louis) to implement reforms that address the core elements of the AAU framework and a specific challenge facing their campus in undergraduate STEM education.
- AAU has actively engaged a broader network of faculty members and administrators at AAU universities committed to improving undergraduate STEM teaching and learning. This [AAU STEM Education Network](#) has convened large conferences annually to discuss innovative practices to improve STEM education and hosted a variety of targeted workshops to address critical issues such as the role of STEM department chairs in educational reforms. AAU recently received a major award to support [institutional mini-grants](#) to further advance and coordinate existing efforts aimed at improving undergraduate STEM teaching and learning.
- AAU has developed resources and collected data to help member campuses track the progress of their reform efforts, understand progress made across the AAU seed-funded project sites, examine the institutional landscape in which STEM innovations take place, and assess the overall impact of the AAU STEM Initiative. In addition, AAU is examining the role that a national higher education association can play in promoting and scaling systemic institutional reforms in undergraduate teaching and learning.
- In partnership with Research Corporation for Science Advancement's Cottrell Scholars Collaborative, AAU is developing specific guidance to departments and institutions on how to implement new methods for evaluating, recognizing, and rewarding teaching at research universities, particularly relating to how teaching is judged for purposes of promotion, tenure, and annual reviews.
- In partnership with federal agencies, AAU is finding new ways to engage faculty to broaden the impact of their research by becoming more innovative in the classroom and by providing for authentic research experiences to undergraduate students.
- AAU is collaborating with other national associations, organizations, funders, and industry partners to coordinate activities relating to undergraduate STEM reform and to develop effective means to disseminate promising and effective programs, approaches, methods, and strategies. The AAU Undergraduate STEM Education Initiative is engaging multiple stakeholders to promote long-lasting reform to undergraduate STEM education and working to address the cultural and policy barriers within research universities that hamper educational improvement and innovation.